

WHAT IS CLAIMED IS:

1. An isolated polynucleotide encoding an auxin-induced primary response 5 polypeptide comprising a member selected from the group consisting of:

- a) a polynucleotide having at least 75% sequence identity, as determined by the GAP algorithm under default parameters, to a polynucleotide of SEQ ID NO: 1 or SEQ ID NO: 5;
- b) a polynucleotide encoding a polypeptide of SEQ ID NO: 2;
- 10 c) a polynucleotide amplified from a Zea mays nucleic acid library using primers which selectively hybridize, under stringent hybridization conditions, to loci within a polynucleotide selected from the group consisting of SEQ ID NOS: 1 and 5;
- d) a polynucleotide which selectively hybridizes, under stringent hybridization conditions and a wash in 0.1X SSC, 0.5% (w/v) SDS at about 65°C for about 30 minutes, to a polynucleotide selected from the group consisting of SEQ ID NOS: 1 and 5;
- e) a polynucleotide of SEQ ID NO: 1 or 5;
- f) nucleic acids deposited with the American Type Culture Collection and designated as PTA-2426 and PTA-2427; and
- 20 g) a polynucleotide comprising at least 25 contiguous nucleotides from a polynucleotide of (a), (b), (c), (d), or (e).

2. A recombinant expression cassette, comprising a member of claim 1 operably linked, in sense or anti-sense orientation, to a promoter. 25

3. A host cell comprising the recombinant expression cassette of claim 2.

4. A transgenic plant comprising the recombinant expression cassette of claim 2. 30

5. The transgenic plant of claim 4, wherein said plant is a monocot.

6. The transgenic plant of claim 4, wherein said plant is a dicot.

7. The transgenic plant of claim 4, wherein said plant is selected from the group consisting of: maize, soybean, sunflower, sorghum, canola, wheat, alfalfa, cotton, rice, barley, 5 millet, peanut, and cocoa.

8. A transgenic seed from the transgenic plant of claim 4.

9. A method of plant hybridization wherein at least one parent comprises the 10 recombinant expression cassette of claim 2.

10. A method of altering the level of ZmAxig1 protein in a plant, comprising:

- a) introducing into a plant cell a recombinant expression cassette comprising a polynucleotide of claim 1 operably linked to a promoter;
- b) culturing the plant cell under plant cell growing conditions;
- c) regenerating from said cultured plant cell a plant which possesses the transformed genotype; and
- d) allowing or inducing expression of said polynucleotide for a time sufficient to alter the level of ZmAxig1 protein in said plant.

20 11. The method of claim 10, wherein the plant is maize, wheat, rice, or soybean.

12. A method of altering the level of ZmAxig1 protein in a plant cell, comprising:

- a) introducing into a plant cell a recombinant expression cassette comprising a polynucleotide of claim 1 operably linked to a promoter;
- b) culturing the plant cell under plant cell growing conditions;
- c) allowing or inducing expression of said polynucleotide for a time sufficient to alter the level of ZmAxig1 protein in said plant cell.

25 30 13. The method of claim 12, wherein the plant cell is from maize, wheat, rice, or soybean.

14. An isolated protein comprising a member selected from the group consisting of:

- a) a polypeptide of at least 20 contiguous amino acids from SEQ ID NO: 2;
- b) a polypeptide of SEQ ID NO: 2;
- 5 c) a polypeptide having at least 75% sequence identity to the entire length of SEQ ID NO: 2, wherein said sequence identity is determined by the GAP algorithm under default parameters; and,
- d) at least one polypeptide encoded by a member of claim 1.

*ZmAxig1* 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1370 1375 1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435 1440 1445 1450 1455 1460 1465 1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520 1525 1530 1535 1540 1545 1550 1555 1560 1565 1570 1575 1580 1585 1590 1595 1600 1605 1610 1615 1620 1625 1630 1635 1640 1645 1650 1655 1660 1665 1670 1675 1680 1685 1690 1695 1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 14. An isolated protein comprising a member selected from the group consisting of:

- a) SEQ ID NOS: 3, 4, and 16;
- b) operable fragments of SEQ ID NOS. 1, 3, 4, 5, and 16;
- c) the nucleic acids deposited with the American Type Culture Collection and designated as PTA-2426 and PTA-2427;
- d) polynucleotides having at least 75% sequence identity to the entire length of SEQ ID NOS: 3, 4, or 16, wherein the % sequence identity is determined by the GAP algorithm under default parameters;
- e) polynucleotides amplified from *Zea mays* nucleic acids using primers selected from the group consisting of SEQ ID NOS: 6, 7, 8, 9, and 10; and
- f) nucleic acids isolated from the 5' regulatory region of a polynucleotide having at least 75% identity to the *ZmAxig1* coding region.

16. An isolated polynucleotide which selectively hybridizes, under stringent hybridization conditions and a wash in 0.1X SSC, 0.5% (w/v) SDS at about 65° for about 30 minutes, to a polynucleotide of Claim 15.

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17. A recombinant expression cassette, comprising a polynucleotide of interest operably linked, in sense or anti-sense orientation, to a transcriptional regulatory element of Claim 15.

5 18. A method of selectively inducing altered expression of a gene of interest in a plant, said method comprising stably incorporating into the genome of said plant an expression cassette of Claim 17 and inducing activation of the transcriptional regulatory element by exposing said plant to an auxin.

10 19. The method of claim 18, wherein said induced alteration in gene expression is tissue-preferred.

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15 20. The method of claim 19, wherein said tissue-preferred alteration in gene expression occurs in one or more of anther, tapetum, and meristem tissues.

21. The method of claim 18, wherein said altered expression results in disruption of plant fertility.

22. The method of claim 18, wherein said altered expression results in partial or 20 complete fertility in an otherwise completely or partially sterile plant.

23. The method of claim 18, wherein the gene of interest is Ms45.

24. The method of claim 18, wherein said plant is a dicot.

25. The method of claim 18, wherein said plant is a monocot.

26. The method of claim 25, wherein said monocot is maize, wheat, or rice.

30 27. A transgenic plant comprising a recombinant expression cassette of Claim 17.

28. The transgenic plant of claim 27, wherein said plant is a monocot.

29. The transgenic plant of claim 27, wherein said plant is a dicot.

5 30. The transgenic plant of claim 27, wherein said plant is selected from the group consisting of: maize, soybean, sunflower, sorghum, canola, wheat, alfalfa, cotton, rice, barley, millet, peanut, and cocoa.

31. A transgenic seed from a transgenic plant of claim 27.

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*✓w4* 32. A method of plant hybridization wherein at least one parent comprises the recombinant expression cassette of claim 17.

15 33. A method of improving transformation efficiency comprising transforming a population of cultured plant cells with an expression cassette comprising a transcriptional regulatory element of claim 15 operably linked to a polynucleotide which stimulates embryogenesis.

20 34. The method of claim 33 wherein the polynucleotide which stimulates embryogenesis is a LEC1 polynucleotide.

35. The method of claim 33 wherein the polynucleotide which stimulates embryogenesis is selected from the group consisting of SEQ ID NOS: 18, 19, and 20.

25 36. The method of claim 33 wherein the polynucleotide which stimulates embryogenesis encodes a polypeptide comprising SEQ ID NO: 21.

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